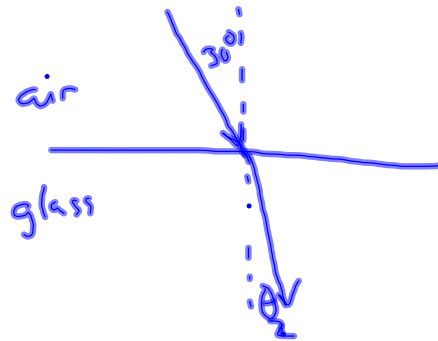


Light Notes and Practice Problems 1.27.12 AP Physics

A light ray of wavelength 589 nm traveling through air is incident on a smooth, flat slab of crown glass ($n = 1.52$) at an angle of 30.0 degrees to the normal.

- Find the angle of refraction.
- Find the speed of this light once it enters the glass.
- What is the wavelength of this light in the glass?



$$a) \quad n_1 \sin \theta_1 = n_2 \sin \theta_2$$

$$\theta_2 = \sin^{-1} \left(\frac{n_1}{n_2} \sin \theta_1 \right)$$
$$= 19^\circ$$

$$b) \quad n = \frac{c}{v}$$

$$v = \frac{c}{n} = 1.97 \times 10^8 \text{ m/s}$$

$$c) \quad v = f \lambda$$

$$\lambda = \frac{v}{f}$$

$$= 387 \text{ nm}$$

$$c = f \lambda$$

$$f = \frac{c}{\lambda}$$

$$= 5.09 \times 10^{14} \text{ Hz}$$

- Critical Angle
 - Angle at which all light is reflected and none is refracted.
 - Happens only when going from higher n to lower n
- This causes total internal reflection, which is used in fiber optics.

• Polarization:

- Light is a transverse E-field perpendicular to a transverse B-field.
- Polarization filters block light that is not parallel to the filter.

HW: P. 1000: 9, 12, 16, 19